FIPS 201 Evaluation Program -
CHUID Reader (Contact) Test Procedure

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1 Overview

Homeland Security Presidential Directive-12 (HSPD-12) - "*Policy for a Common Identification Standard for Federal Employees and Contractors*" directed the promulgation of a new Federal standard for a secure and reliable form of identification issued by all Federal Agencies to their employees and contractors.

In addition to derived test requirements developed to test conformance to the NIST standard, GSA has established interoperability and performance metrics to further determine product suitability. Vendors whose products and services are deemed to be conformant with NIST standards and the GSA interoperability and performance criteria will be eligible to sell their products and services to the Federal Government.

1.1 Identification

This document provides the detailed test procedure that needs to be executed by the Lab in order to evaluate the CHUID Reader (Contact) (henceforth referred to as the Product) against the subset of applicable requirements that need to be electronically tested for this category.

2 Testing Process

As previously mentioned, this document prescribes detailed test steps that need to be executed in order to test the requirements applicable for this category. Please note that conformance to the tests specified in this document will not result in the Product being compliant to the applicable requirements of FIPS 201. The Product must undergo an evaluation using all the evaluation criteria listed for that category prior to being deemed as compliant. Only products and services that have successfully completed the entire Approval Process will be designated as conformant to the Standard. To this effect, this document only provides details for the evaluation using the Lab Test Data Report approval mechanism.

A Lab Engineer follows the steps outlined below in order to test those requirements that have been identified to be electronically tested. The end result is a compilation of the observed behavior of the Product in the Lab Test Data Report.

For this category, there are two potential Laboratory evaluation paths. If PIV Card Reader submitted for evaluation has a Wiegand™ or USB interface, then it will be evaluated as described in section 3.2.

If PIV Card Reader submitted for evaluation uses any other Reader-to-Host interface, the manufacturer will be required to provide all required documentation specified by corresponding approval and test procedures, as well as demonstrate in the Lab, the product's ability to meet the Laboratory requirements described in section 3.1 of this document. The PIV Card Reader must print a test report which shall be used by the Lab as test data, and incorporated in the application package.

Section 3 provides the test procedures that need to be executed for evaluating the Product as conformant to the requirements of FIPS 201.

3 Test Procedure for CHUID Reader (Contact)

3.1 Requirements

The following table provides a reference to the requirements that need to be electronically tested within the Lab as outlined in the Approval Procedures document for the Product. The different test cases that are used to check compliance to the requirements is also cross-referenced in the table below.

<table>
<tr><th>Identifier #</th><th>Requirement Description</th><th>Source</th><th>Test Case #</th></tr>
<tr><td>R-CHU-C.3</td><td>PIV readers shall support the Class A operating class as defined in ISO/IEC 7816-3:1997 and ISO/IEC 7816-3:1997/Amd 1:2002.</td><td>Card /Card Reader Interoperability Requirements, Section 2.2.2.2</td><td>R-CHU-C-TP.1</td></tr>
<tr><td>R-CHU-C.4</td><td>The contact interface of the reader shall support both the T=0 and T=1 transmission protocols as defined in ISO/IEC 7816-3:1997.</td><td>Card /Card Reader Interoperability Requirements, Section 2.2.2.3</td><td>R-CHU-C-TP.2</td></tr>
<tr><td>R-CHU-C.6</td><td>For evaluation purposes, the data format for physical readers shall consist of the two parity bits, Agency Code, System Code and Credential Code elements of the FASC-N along with the Expiration Date (YYYYMMDD) from the CHUID as defined by appendix A of NIST SP 800-73. Each element shall be individually formatted as binary numbers and combined to form a 75 bit string as shown in the figure below. Section 5 of the SIA standard defines a 26 bit format that does not meet the requirements outlined in FIPS or its supporting documents and shall not be used.
<table>
<tr><th></th><th>Position</th><th>Length</th></tr>
<tr><td>Parity Bit P1</td><td>1</td><td>1</td></tr>
<tr><td>Agency Code</td><td>2-15</td><td>14</td></tr>
<tr><td>System Code</td><td>16-29</td><td>14</td></tr>
<tr><td>Credential Code</td><td>30-49</td><td>20</td></tr>
</table></td><td>CHUID Reader (Contact) Test Procedure</td><td>R-CHU-C-TP.3</td></tr>
</table>

	<table><tr><td>Expiration Date</td><td>50-74</td><td>25</td></tr><tr><td>Parity Bit P2</td><td>75</td><td>1</td></tr></table> Note: The first parity bit (P1) is even and shall be calculated over the first 37 bits. The second parity bit (P2) is odd and shall be calculated over the last 36 bits.		
R-CHU-C.13	Data received from the reader shall be the data that was written by the lab on each "Golden" test card.	Derived Test Requirement	R-CHU-C-TP.4

Table 1 - Applicable Requirements

3.2 Test Components (Applicable only for Wiegand Interface devices)

3.2.1 Baseline Configuration

The baseline configuration describes initial state of the Card Reader Test Fixture and its associated components. A Lab Engineer commences execution of this test procedure after performing the necessary updates to the baseline configuration based on the requirements of the test cases described below.

The Card Reader Test Fixture includes the following components as part of its baseline configuration:

1. The Host System – It includes the workstation and the Test Application software.
2. Breakout Box – The USB and Serial Communication cables from the breakout box are connected to the Host System.

Figure 1 provides an illustration of the baseline configuration for the Card Reader Test Fixture.

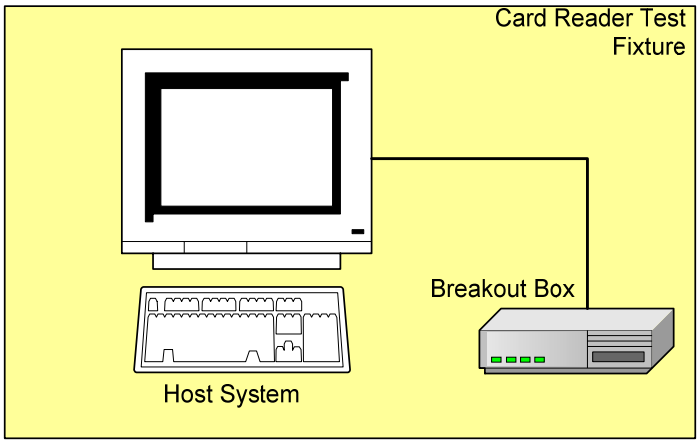


Figure 1 - Card Reader Test Fixture Baseline Configuration

3.2.2 Components Details

Table 2 provides the details of all the components required by the Lab to execute this test procedure. Based on the different test cases, different components may be required to execute the test case.

#	Component	Component Details	Identifier
1	The Card Reader Test Fixture	-	CRTF
2	Contact PIV Card Reader under test	-	PROD
3	A PIV Card that supports the Class A operating Class only	Gemplus GemCombi Xpresso R4 E72K PK card with the Gemplus GemPIV applet v1.01	PCARD-CLA
4	A PIV Card that supports the T=0 transmission protocol only	Gemplus GemCombi Xpresso R4 E72K PK card with the Gemplus GemPIV applet v1.01	PCARD-T0
5	A PIV Card that supports the T=1 transmission protocol only	SafeNet Model 400 Smart Card (72K) SCCOS Version 3.0 with PIV card application	PCARD-T1

Table 2 - Test Procedure: Components

3.3 Test Cases

This section discusses the various test cases that are needed to test physical access PIV Card contact-readers that read CHUID data. Vendors submitting such Products are required to demonstrate in the Lab that the product meets the same requirements mentioned in Section 3.1.

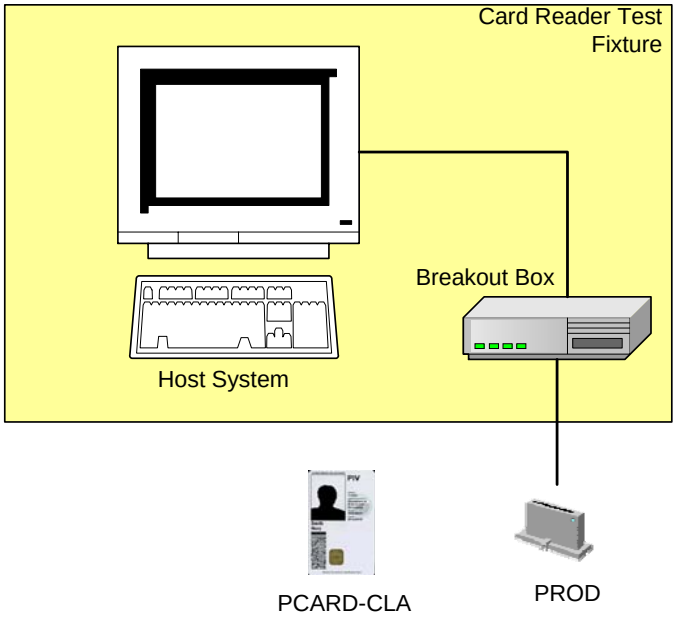
Vendors will be provided with an eight foot (8') table and four (4) 120 volt AC outlets. Vendor shall be given one (1) Lab workday to demonstrate products ability to meet the said requirements. Upon completion, Vendor is required to print the results of testing for each requirement, which will be incorporated into the Lab Test Data Report.

3.3.1 Test Case R-CHU-C-TP.1

3.3.1.1 Purpose

The purpose of this test is to verify that the PIV reader supports the Class A operating class as defined in ISO/IEC 7816-3:1997 and ISO/IEC 7816-3:1997/Amd 1:2002.

3.3.1.2 Test Setup

Equipment :	The following components are necessary for executing this test case: ▪ CRTF ▪ PCARD-CLA ▪ PROD
Configuration Diagram :	 **Figure 2 - Configuration Diagram for Test Case R-CHU-C-TP.1**
Preparation	▪ Install the drivers for the PROD in accordance with the manufacturer provided documentation. ▪ Connect the PROD into the appropriate port in the breakout box of the CRTF. ▪ Verify that the PROD is correctly installed by reviewing its presence in list of hardware using the device manager of the host system.

3.3.1.3 Test Process

Test Steps:	1. Execute the Test Application on the CRTF. 2. Make sure that the details of PCARD-CLA are entered into the Test Application using the File → Edit Reference Contact Card Implementation Info (See Figure 7 - Reference Card Information (Contact)). 3. Select the tab for the "CHUID Reader (Contact)". This selects the test for the CHUID Reader (Contact) in the Test Application (See Figure 6 - Test Screen for the CHUID Reader (Contact)). 4. Fill in all the information as required in the screen for the testing PROD as shown in Figure 6.

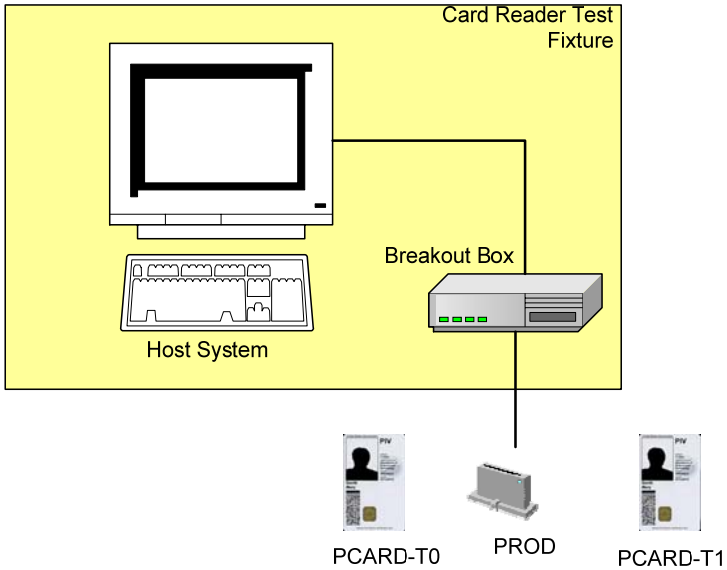
	5. Select the Test Case radio button corresponding to R-CHU-C-TP.1 6. Insert PCARD-CLA into PROD. 7. Click on the "Execute Test" button. Follow the steps on the screen. 8. Verify that the test was completed by reviewing the result on the screen.
Expected Result(s):	1. The test completes successfully showing that the CHUID Reader (Contact) supports Class A operating class as defined in ISO/IEC 7816-3:1997 and ISO/IEC 7816-3:1997/Amd 1:2002.

3.3.2 Test Case R-CHU-C-TP.2

3.3.2.1 Purpose

The purpose of this test is to verify that the contact interface of the reader supports both the T=0 and T=1 transmission protocols as defined in ISO/IEC 7816-3:1997.

3.3.2.2 Test Setup

Equipment :	The following components are necessary for executing this test case: ▪ CRTF ▪ PCARD-T0 ▪ PCARD-T1 ▪ PROD
Configuration Diagram :	 **Figure 3 - Configuration Diagram for Test Case R-CHU-C-TP.2**
Preparation	▪ No further preparation required in addition to that described in Test

	Case R-CHU-C-TP.1

3.3.2.3 Test Process

Test Steps:	1. Select the Test Case radio button corresponding to R-CHU-C-TP.2 2. Make sure that the details of PCARD-T0 and PCARD-T1 are entered into the Test Application under File → Edit Reference Contact Card Implementation Info in the menu bar at the top of the Application window (See Figure 7 - Reference Card Information (Contact)). 3. Insert PCARD-T0 into PROD. 4. Click on the "Execute Test" button. Follow the steps on the screen. 5. When prompted, insert PCARD-T1 into PROD. 6. Click the "OK" button to proceed. 7. Verify that the test was completed by reviewing the result on the screen.
Expected Result(s):	1. The test completes successfully showing that the CHUID Reader (Contact) supports both the T=0 and T=1 transmission protocols as defined in ISO/IEC 7816-3:1997.

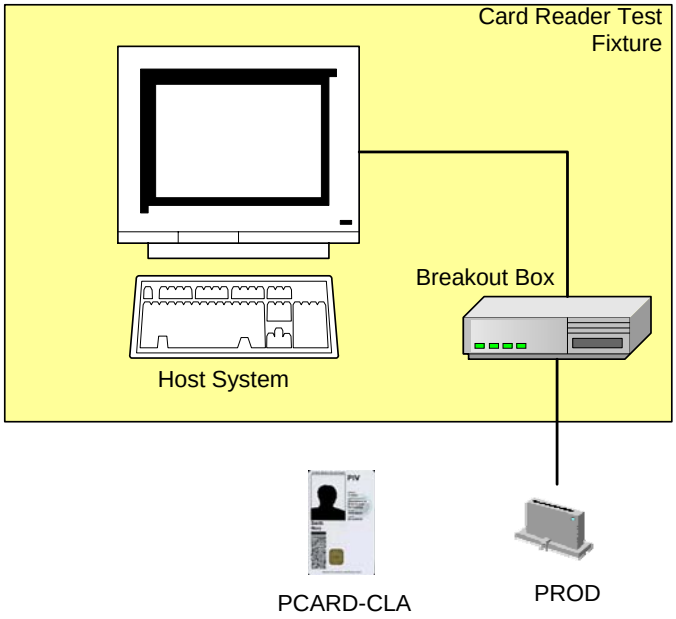
3.3.3 Test Case R-CHU-C-TP.3

3.3.3.1 Purpose

The purpose of this test is to verify that the PIV reader is parsing the correct data elements from the CHUID.

3.3.3.2 Test Setup

Equipment :	The following components are necessary for executing this test case: ▪ CRTF ▪ PCARD-CLA ▪ PROD

Configuration Diagram:	 **Figure 4 - Configuration Diagram for Test Case R-CHU-C-TP.3**
Preparation:	▪ Generate a new CHUID object and load it onto PCARD-CLA ▪ Load the data into the <*configuration file*> for PCARD-T0 and PCARD-T1 on the CRTF.

3.3.3.3 Test Process

Test Steps:	1. Select the Test Case radio button corresponding to R-CHU-C-TP.1 2. Make sure that the details of PCARD-CLA are entered into the Test Application by selecting File → Edit Reference Contact Card Implementation Info menu of the top of the Application window (See Figure 7 - Reference Card Information (Contact). 3. Insert PCARD-CLA into PROD. 4. Click on the "Execute Test" button. Follow the steps on the screen. 5. Verify that the test was completed by reviewing the result on the screen.
Expected Result(s):	1. The test completes successfully showing that the CHUID Reader (Contact) has parsed the correct data elements according to the following table:

	Position	Length
Parity Bit P1	1	1
Agency Code	2-15	14
System Code	16-29	14

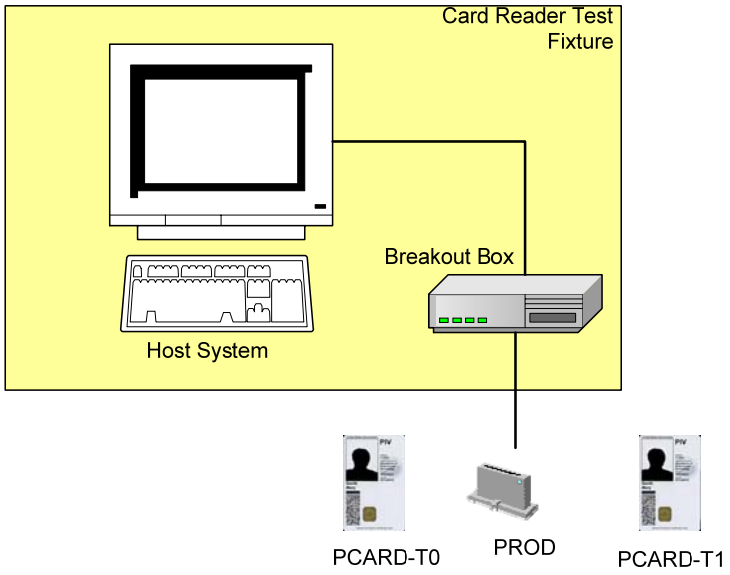
		Credential Code	30-49	20
		Expiration Date	50-74	25
		Parity Bit P2	75	1

3.3.4 Test Case R-CHU-C-TP.4

3.3.4.1 Purpose

The purpose of this test is to verify that the data received through the contact interface of the reader is the data that was expected, and not corrupted during transmission.

3.3.4.2 Test Setup

Equipment:	The following components are necessary for executing this test case: ▪ CRTF ▪ PCARD-T0 ▪ PCARD-T1 ▪ PROD
Configuration Diagram:	 **Figure 5 - Configuration Diagram for Test Case R-CHU-C-TP.4**
Preparation:	▪ Generate some test data that resembles a CHUID object. *Note:* This data must be uniquely generated for each Product submitted for testing. ▪ Load the data into the <*configuration file*> for PCARD-T0 and PCARD-T1.

3.3.4.3 Test Process

Test Steps:	1. Select the Test Case radio button corresponding to R-CHU-C-TP.4 2. Make sure that the details of PCARD-T0 and PCARD-T1 are entered into the Test Application by selecting File → Edit Reference Contact Card Implementation Info menu of the top of the Application window (See Figure 7 - Reference Card Information (Contact)). 3. Insert PCARD-T0 into PROD. 4. Click on the "Execute Test" button. Follow the steps on the screen. 5. When prompted, insert PCARD-T1 into PROD. 6. Click the "OK" button to proceed. 7. Verify that the test was completed by reviewing the result on the screen.
Expected Result(s):	1. The test completes successfully showing that the CHUID Reader (Contact) has passed the data that was placed on PCARD-T0 and PCARD-T1 to CRTF.

4 CHUID Reader (Contact) Test Application Screens

4.1 Testing Screen

The following represents a screen shot of the Test Application that is used when testing a CHUID Reader (Contact). The Lab Engineer is expected to manually provide the information for **CHUID Reader (Contact) Product Information**, **Tester Information,** and **Test Case Selection** when completing testing.

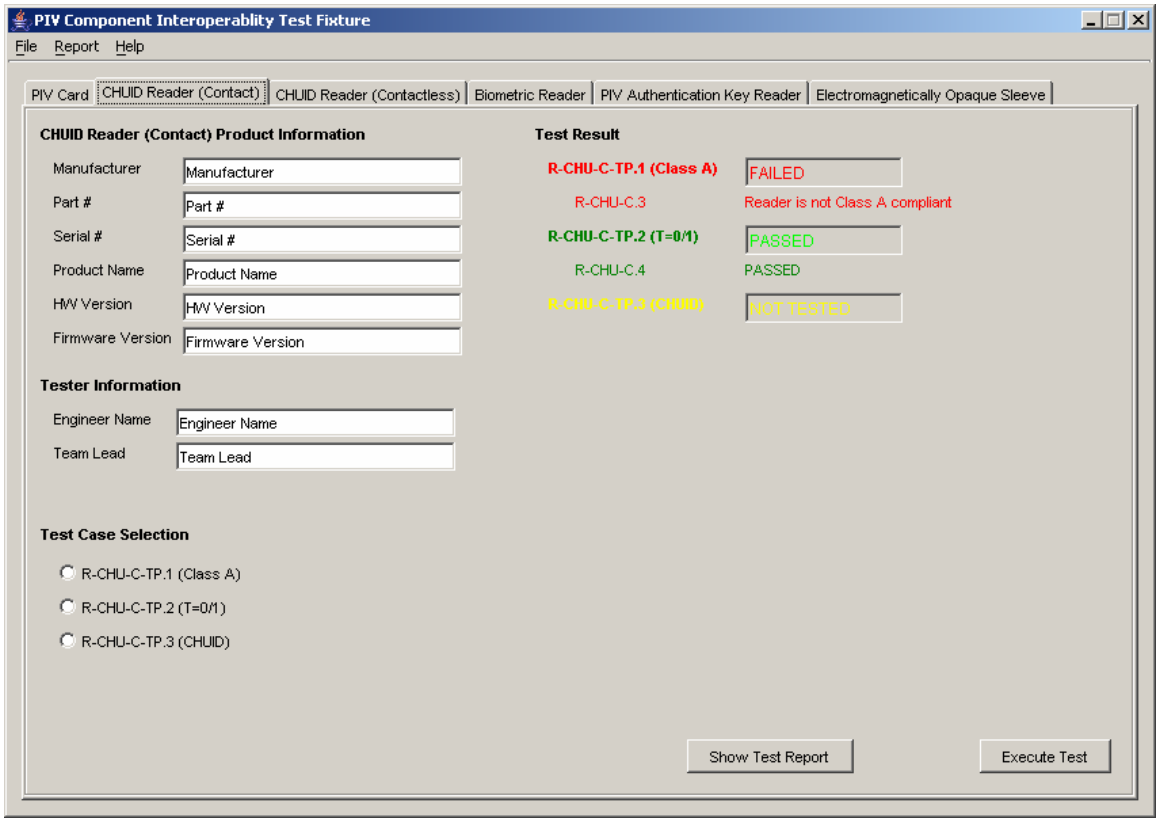


Figure 6 - Test Screen for the CHUID Reader (Contact)

4.2 Reference Contact Card Information

The following screen shot depicts the configuration window that will need to be edited to contain the details of the PIV Cards used during testing. Lab Engineers are expected to fill in all fields listed in this window prior to beginning the applicable test.

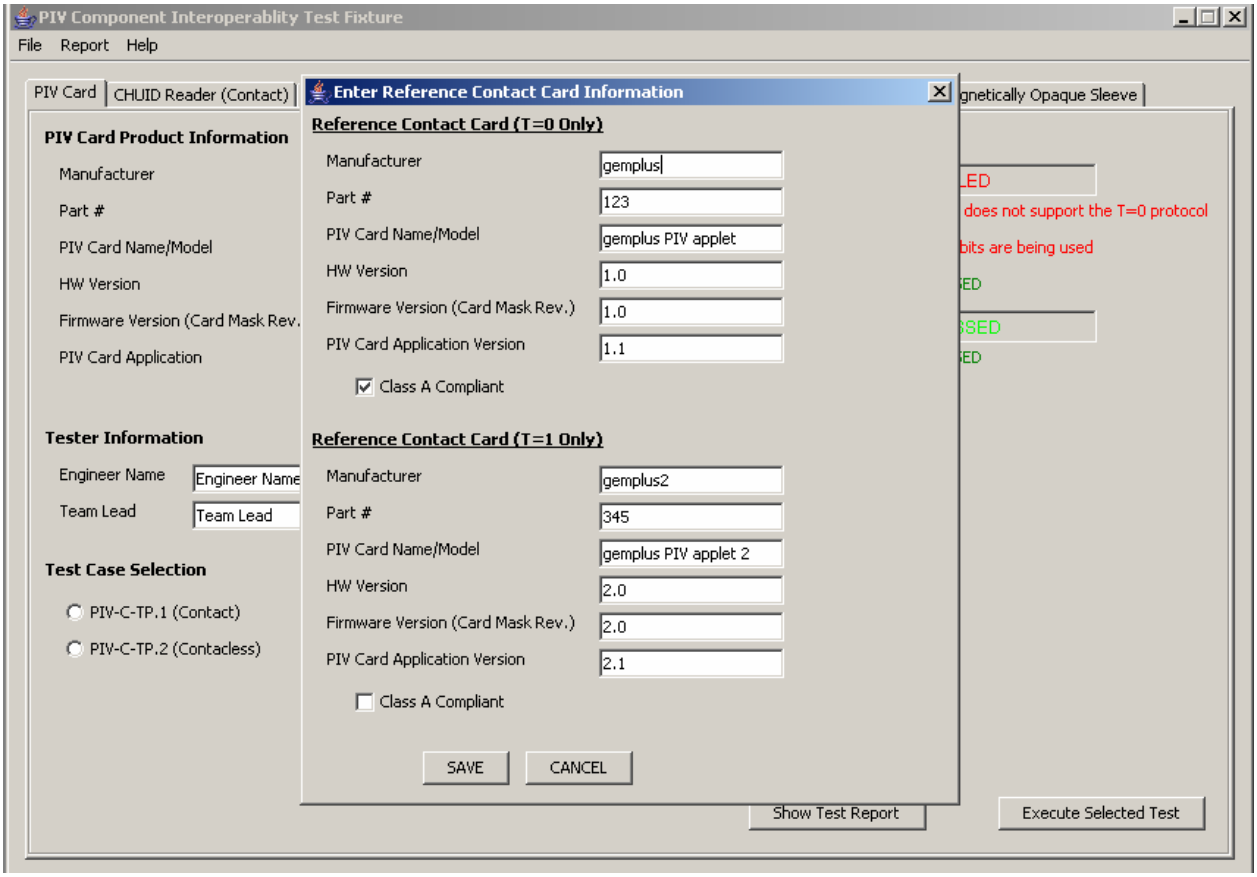


Figure 7 - Reference Card Information (Contact)

4.3 Test Report Screen

The following represents a screen shot of the test report that is generated by the Test Application after the CHUID Reader (Contact) testing has been completed. It provides the Lab Engineer with a reference of what to expect as a result of successful execution of the test procedure. A Lab Engineer is not expected to fill out any portion of the report manually.

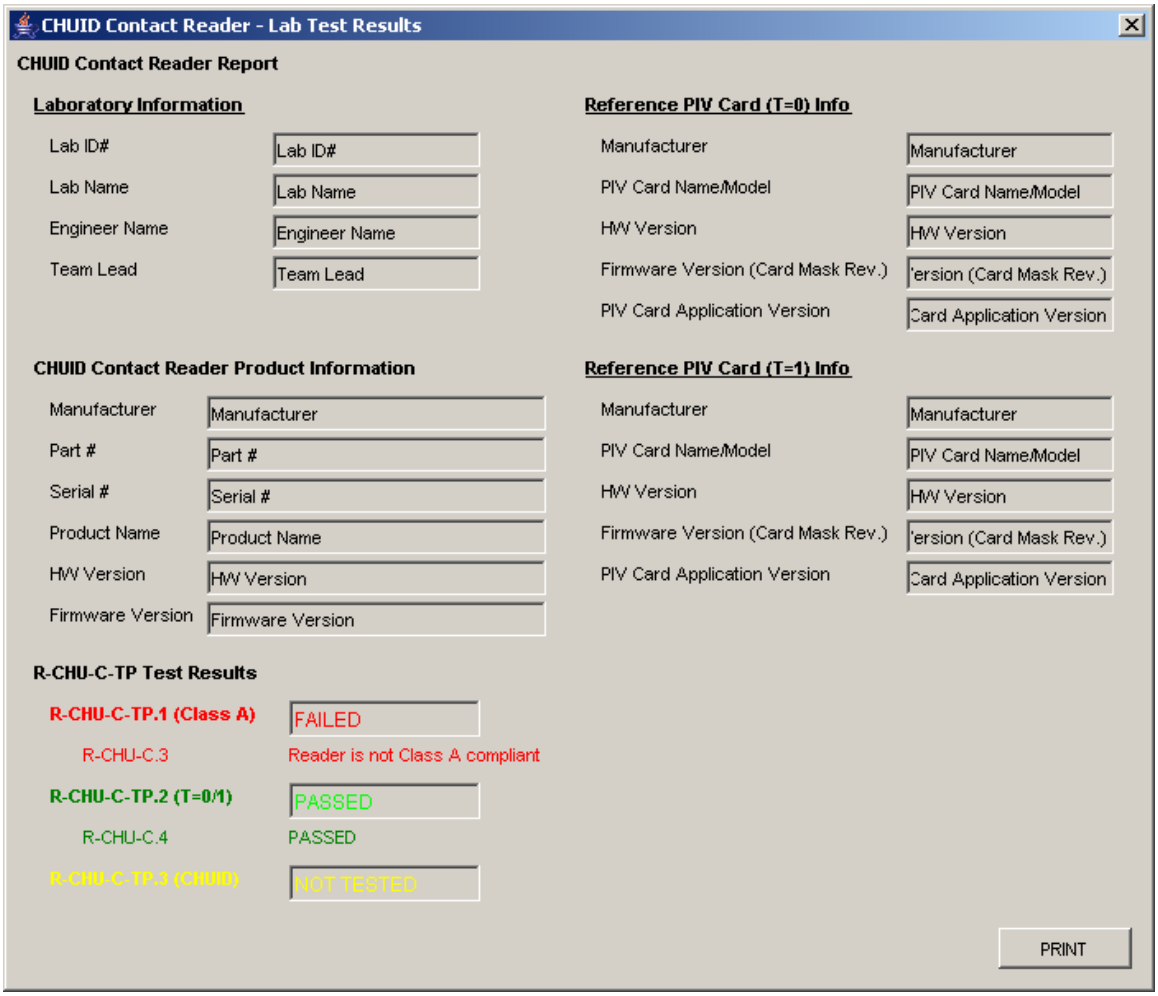


Figure 8 - Test Report for the CHUID Reader (Contact)